

Culter Sieboldii, from the Amur, seems to me to be the same fish.

Coilia nasus, Schleg.

Vernacular name: *Tao yu*.

It may appear doubtful whether Basilewsky's *Osteoglossum prionostoma* should be referred to this species or to *Coilia clupeioides*.

Chatoëssus punctatus, Schleg.

Vernacular name: *Hai chi yu*.

Harpodon nehereus, H. B.

Vernacular name: *Mien tiao yu*.

Anguilla bostoniensis, Les.

Vernacular name: *Shan yu*.

The eel in Dr. Morrison's collection shows the technical characters of the form "*bostoniensis*," although also *Anguilla vulgaris* and *A. mauritanica* have been brought from China. It will always be doubtful to which of these forms Basilewsky's *A. pekinensis* should be referred.

Trygon, sp.

A young specimen, without tail.

Vernacular name: *Yang yu*.

EXPLANATION OF PLATE XIII.

Fig. A. *Opsariichthys Morrisonii*.

Fig. B. — *bidens*.

XLIII.—*Notes on the Physical Aspects and on the Food-Fishes of the Liao Basin, North China.* By W. MORRISON, M.D.

AT the request of Dr. Günther I offer herewith a few notes, supplementary to the preceding paper, on the physical aspects of the Liao basin and on the food-fishes of Newchwang, some of which are not included in the collection made for me by H.M. Consul, Mr. A. Hosie, and described by Dr. Günther.

The chief source of the Liao River is in Mongolia, near the southern termination of the Kinghan range of mountains, in lat. 43° 30' N. and long. 118° E. During its course

through Mongolia it is named the Sira muren (yellow river). The direction is easterly for about 300 miles. Soon after entering Manchuria the course changes from E. to S.S.W., and it is thenceforth named the Liao. Altogether after a course of about 600 miles it enters that portion of the Yellow Sea named the Gulf of Liau-tong, near the treaty port of Newchwang, in lat. $40^{\circ} 57' N.$, long. $121^{\circ} 27' E.$

Near its southward bend it receives from the north the Hen-su River, and soon after the Kai-yuen branch from the north-east.

In the alluvial plain the chief tributary on the left bank is formed by the union of two rivers—the Hun, which flows south-west near Mukden (the Manchurian capital), and the Tai-tzu, which flows west past the city of Liauyang. The river formed by their union, after a very brief course, joins the Liao 60 miles north from Newchwang.

Tributaries, though not so important, are also received from the west.

Northward in lat. 44° a low range forms the watershed between the Liao and Songari. The tributaries which are there in close proximity are the Y-tung, which flows north to the Songari, and the Hen-su, which flows south to the Liao.

From the Gulf to the rise of the Hen-su the basin of the Liao has a length of about 300 miles. In addition, and of nearly equal length, there is the western prolongation along the course of the Sira muren.

Viewing the Sira muren and Liao as one river, the physical conditions admit of a threefold division. The first section of the course is among mountains with intervening valleys, possessing a considerable rainfall. Next there is a portion that flows through steppe country, with small rainfall and few tributaries. The last and chief portion is that which flows through the great alluvial plain, where important tributaries are received and the rainfall is moderate, but subject to occasional variations. The Hun and Tai-tzu tributary rivers, which have been visited by me, are clear rivers flowing over pebbly bottoms.

At Newchwang, 10 miles distant from the sea, the river is $\frac{1}{4}$ mile broad and from 20 to 30 feet deep. The tidal influence extends to about 20 miles above Newchwang. The river is navigable for river cargo-boats for about 200 miles. There is no proper estuary. The river has cut a channel for itself, outward into deep water, amid shallows and sandbanks.

The rocky coast of the peninsula to the east is distant by boat about 12 miles from the river's mouth. There behind

some rocky promontory is situated the fishing village, and fishing junks and boats of various sizes find friendly shelter. Shore fishermen also reside in cottages scattered along the seaboard. Wooden stilts, 4 to 5 feet in height, which when in use are strapped firmly to the leg, are in requisition. By their aid the fishermen can wade in deep water. A large net is pushed along in front; a small hand-net is kept for emptying it, while the fish-basket, supported on floats, is dragged behind.

While on a visit there I have observed that the Algæ growing on rocks were scarce and stunted, and the shells of shore-mollusks seemed dwarfed in size. Mud held in suspension must be an important factor in determining the forms of life that find in the river a suitable habitat. Distributed by currents it may also have a modifying influence on the fauna of the adjacent coast. Temperature is also an important factor. For two months in summer the heat is tropical, while during the winter the sea is frozen across for from two to three months.

When the river is in flood the country is under water for long distances. When the waters subside fish can be caught in pools and ditches by waysides.

Fishing to a limited extent is carried on during winter through holes made and kept open in the ice.

In addition to the fishes enumerated in Dr. Günther's paper others, belonging to the genera *Scomber*, *Gadus*, *Clupea*, *Platessa*, and *Solea*, may be found at times in the market at Newchwang.

The genus *Culter*—like the greater number of specimens in the collection—is in common use for food among the Chinese, but does not appear on the table of foreign residents.

Mugil so-iuy is a valuable food-fish. The flesh is a little softer than that of the herring or trout, but the flavour is pleasant, and it is procurable for the greater part of the year.

Harpodon nehereus (the "silver fish" of foreign residents) answers in some measure to "whitebait," and is in frequent request for the foreign table.

Anguilla bostoniensis.—Smoked eel affords a palatable dish.

During winter fish are readily preserved in the frozen condition. This affords facility for transport, but makes it at times difficult to trace the species to their native habitat. The "codfish" (size comparable to that of an average haddock) of foreign residents is caught on the western coast of the peninsula during the early days of December, and, along with oysters of good quality, sent up to the port in the frozen condition. It is not supplied at any other time. Like-

wise during winter the following are imported from the Songari:—

Acipenser mantschuricus (“huang yu”).—This fish furnishes “caviare” more suitable to Russian low temperatures and gastric capabilities than to the ordinary resident at treaty ports. The flesh of the sturgeon is very palatable, but unsuitable to persons with weak digestion.

“White Fish” (length 18 inches and upwards) comes to Newchwang from the Songari *viâ* Mukden, where it is known by foreign residents under that name—probably a translation from the Chinese words “pai yu.” This fish is of excellent quality and flavour, approaching in these respects to the famous “Sam lai” imported here from Shanghai, and stated by Richardson (Ichthyol. China, p. 305) to be *Alosa Reevesii* and *A. palasah*.

Salmo, sp. ?—The Salmonoid imported in late autumn to Newchwang by steamers from the Amur is probably identical with that found in the lower Songari; it is known to ascend the Songari as far as San-sing near lat. 47° N. In the Hurka, a tributary which joins the Songari at San-sing, travellers describe its capture during the spawning-season in immense numbers. There its name is *Tu-ma-ha*. It forms the staple supply of food, and yields oil and clothing for the Yapi-Ta-tzu, or Fish-skin Tartars. These Salmonoids show a remarkable uniformity in size, the average weight being 10 lbs. There are two large teeth in each jaw. The colour (while spawning) is darker and lacks the silvery lustre of *Salmo salar*. The sides are marked with extensive pink patches.

Salmo, sp.—Möllendorff (Verteb. of Chili, in Journ. N. C. B. Roy. As. Soc. 1877, p. 107) states that he had not been able himself to discover a specimen of Salmonidæ in Chili. A specimen was brought to him, however, by a friend from a locality about 150 miles north of Pekin, where they were stated to exist in abundance, and were procurable up to 1½ feet in length. The specimen was young and not very well preserved, but was that of an undoubted trout. The colour was reddish grey with small black spots. This fish did not agree with any European species, and was believed to come from an affluent of the Luan River. Chinese name ‘hua-yu, i. e. spotted fish.